Poultry Waste Generation and Land Application in the Illinois River Watershed and Phosphorus Loads to the Illinois River Watershed Streams and Rivers and Lake Tenkiller

Expert Report of Dr. B. Engel

For
State of Oklahoma
In Case No. 05-CU-329-GKF-SAJ

State of Oklahoma v. Tyson Foods, et al.
(In the United States District Court for the Northern District of Oklahoma)

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1. Executive Summary/Conclusions

Illinois River Studies
Numerous studies have explored phosphorus (P) loads in the Illinois River Watershed (IRW) to the streams and rivers within the watershed and to Lake Tenkiller. Observed data and models indicate nonpoint source pollution is the major contributor to P within the streams and rivers of the IRW and to Lake Tenkiller. Poultry waste application within the IRW to pastures is identified as a substantial contributor to overall P loads within IRW streams and rivers and Lake Tenkiller.

Poultry Waste and P Generation
Each of the defendants' poultry operations within the Illinois River Watershed (IRW) produces a substantial amount of poultry waste and phosphorus. Poultry waste produced within the IRW range between 354,000 and more than 500,000 tons annually. Phosphorus content of the poultry waste ranges from 8.7 million to nearly 10 million pounds annually.

Poultry Waste Land Application
Common practice for poultry waste disposal is land application to pasture and cropped areas. A substantial amount of the defendants' poultry waste and P is land applied within the IRW annually. The poultry waste is applied during the rainy season from late winter through spring.

Observed P Loads in the Illinois River Watershed
The P loads to Lake Tenkiller averaged approximately 505,000 lbs annually between 1997 and 2006. This represents a significant P load to the lake and is much greater per unit area than for other watersheds the region.

Point Sources of P in the Illinois River Watershed
A portion of the P in the IRW reaching Lake Tenkiller is from Waste Water Treatment Plant (WWTP) discharges. P discharges from IRW WWTP have changed over time peaking at slightly more than 204,000 lbs annually in the late 1990s and early 2000s. Beginning in 2003, WWTP P discharges decreased to a little more than 90,000 lbs annually in the IRW due to changes in WWTP technology. The defendants' processing facilities discharge a significant amount of P to WWTPs and thus contribute to point P sources within the IRW.

Phosphorus Mass Balance
A P mass balance for the Illinois River Watershed indicates poultry production is a substantial contributor to P within the Illinois River Watershed. Poultry production within the Illinois River Watershed is currently responsible for more than 76% of P movement into the watershed.

P Loads in the IRW Based on Continued Poultry Waste Land Application
Average annual P loads to water in the Illinois River Watershed attributable to poultry waste application to pastures is calculated at between 432,000 lb to nearly 500,000 lb annually based on poultry P application to the landscape and literature P loss coefficients.